



CHAPTER EIGHT

PUBLIC HEALTH/AQUATIC LIFE CONCERNS

HAR Chapter 11-54-04 establishes toxicity standards for acute and chronic exposure in fresh and salt water, and human health standards for fish consumption. These standards would be used to determine if elevated levels of toxicants existed. There are no standards for toxics in sediments.

Elevated levels of toxicants may occur in the water column, in fish tissue or in sediments. DOH conducted no toxics monitoring for any of these media for several reporting cycles due to restrictions to the monitoring budget.

The following table (Table 15) displays the extent of toxicant-caused problems in each waterbody type. The totals were generated by WBS from waterbody-specific information. Toxics in sediment sampling results used in the waterbody evaluations were from previous reporting cycles.

TABLE 4-14: TOTAL SIZE AFFECTED BY TOXICANTS

WATERBODY	SIZE MONITORED FOR TOXICANTS ^a	SIZE WITH ELEVATED LEVELS OF TOXICANTS ^b
RIVERS (miles)	0.00	0.00
LAKES (acres)	0.00	0.00
ESTUARIES (square miles)	4.15	0.02
COASTAL WATERS (miles)	5.65	0.00
FRESHWATER WETLANDS (acres)	0.00	0.00
TIDAL WETLANDS (acres)	0.00	0.00

^a The totals for this column were generated by WBS from those waterbodies which had a "yes" entered in the "Monitored for Toxics" field.

^b The totals for this column were generated from waterbody-specific information in WBS.



PUBLIC HEALTH/AQUATIC LIFE IMPACTS

FISHING AND SHELLFISHING ADVISORIES IN EFFECT

There was one incident of fish tissue contamination reported in 1992. An investigation revealed that tilapia from Manoa Stream on Oahu contained high levels of lead. The lead levels were originally identified in an EPA study in 1984, but the results were not immediately investigated. The 1992 investigation revealed that the lead levels had decreased, but were still high. Consequently, while there are no restrictions on the consumption of the fish, a general advisory is in effect and will remain in place for the foreseeable future.

No other fish or shellfish advisories are in effect.

POLLUTION CAUSED FISH KILLS/ ABNORMALITIES

Investigations of fish kills are normally conducted by the Department of Land and Natural Resources. A summary of their investigations for the period from January 1996 to December 1997 is listed below. All were relatively insignificant incidents and details were sketchy.

For 1996, there were 3 reported fishkills:

May report:

Waikiki - involving oceanic puffer fish - Natural phenomenon.

June report:

no information available

November report:

Involved tilapia in a canal, flow stoppage, oxygen debt.

For 1997, there were no reported fishkills.

These fish kills were apparently one-time occurrences, and not necessarily caused by pollutants.



**SITES OF KNOWN
SEDIMENT
CONTAMINATION**

From 1927 to 1963 wastewater from the Pioneer Flintkote Canec Plant was discharged into Wailoa Pond. The wastewater contained arsenic trioxide (As_2O_3) which was used as a termite treatment agent in the canec boards. A 1978 study identified sediment levels as high as 6370 ppm. Hilo Bay sediments also showed arsenic levels above normal levels with the highest concentrations near the mouth of the Wailoa River and decreasing toward the outer parts of the harbor. Levels were consistent up to a depth of 35 cm. This is the most significant example of sediment contamination in the State.

Other metals such as copper, zinc, chromium, nickel and lead have also been identified, but generally all of these, except for lead, tend to correspond with soil mineral composition and weathering of Hawaiian basalts. Since the original studies, subsequent studies have shown lead levels decreasing in proportion to the reduction of lead additives in gasoline. However, this correlation has not been proven.

No sediment samples were taken during the current reporting cycle.

**SHELLFISH
RESTRICTIONS/
CLOSURES IN EFFECT**

There are currently no restrictions on the consumption of any shellfish in effect. There were no such restrictions or closures during the reporting period.

**RESTRICTIONS ON
SURFACE DRINKING
WATER SUPPLIES
DURING THE
REPORTING CYCLE**

There were no restrictions imposed on any surface drinking water source during this reporting cycle. Any stream or surface drinking water source can be used as a regulated water system, with all necessary approvals from the Commission on Water Resource Management, DLNR and the SDWB, DOH. If the source is contaminated then treatment must be applied, and the purveyor must comply with safe drinking water regulations. The primary contaminants of concern are bacteriological because surface sources are usually situated in pristine watershed areas away from land use activities. Because of the cumbersome treatment requirements imposed on surface sources, such as the Surface Water Treatment Rules, purveyors are looking to use more groundwater sources for potable water supplies.



**RESTRICTIONS ON
BATHING AREAS
DURING THIS
REPORTING CYCLE**

During this reporting cycle there were no beach closures. There were ten incidents which required posting of beaches. In addition, there was also an extraordinary series of storm events in November 1996 which resulted in flood conditions in a number of areas. Flood waters inundated nearly all of the near-coastal waters of all the islands. Consequently, precautionary warning signs were posted along the North and West shores of Oahu, which suffered the heaviest impacts.

**INCIDENTS OF
WATERBORNE DISEASE
DURING THIS
REPORTING CYCLE**

There were no reported incidents of waterborne diseases during this reporting cycle.

**OTHER AQUATIC LIFE
IMPACTS OF
POLLUTANTS AND
STRESSORS**

There were no documented impacts from pollutants or stressors on aquatic life. (This includes reproductive interference, and threatened/endangered species impacts.)

**NATURE AND LIMITS
OF TOXICS
MONITORING**

There was no toxics monitoring conducted during this reporting period and therefore, the nature and limits of the toxics monitoring program are not discussed. It should be noted, however, that impacts from toxics are minimal and as such, are much less of a concern versus other water quality problems like nonpoint source pollutants from runoff.

LEPTOSPIROSIS

Leptospirosis is caused by a pathogenic spirochete bacteria, and is transmitted directly or indirectly by contact with urine or tissues of infected animals. Previously, exposure was mainly occupational (such as farming, animal husbandry). But now recreational exposure (through fresh water wading, swimming, boating, fishing, etc.) is becoming more prevalent.

In the State of Hawaii, physicians are required to report all suspected cases to the Department of Health Epidemiology Branch, where a screening test on serum samples is provided. Paired serum samples are submitted to the



Center for Disease Control for serological confirmation of the disease. The Department laboratory also provides EMJH semisolid culture media for isolation of leptospires to hospital and clinical laboratories, and will incubate the cultures and provide for serovar identification of all positive cultures.

The Epidemiology Branch of the Department of Health investigates all reported cases and has collected an extensive database of cases from 1970. The results are published in annual reports. The following describes the latest information regarding incidences of Leptospirosis in the State.

1996 Leptospirosis Summary

Fifty-two cases of leptospirosis were diagnosed in Hawai'i in 1996, the largest number of cases detected via passive surveillance in any year since 1971, and almost double the reported cases in 1995. Kaua'i reported the largest number of cases (21 or 40%), followed by Hawai'i, O'ahu and Maui. The number of cases from O'ahu (11) and Maui (4) were the highest ever reported in a single year from those islands. In addition, three individuals were diagnosed with the disease in Hawai'i but had been exposed abroad (one each in Costa Rica, Guam and Micronesia).

In 1997, 14 cases had been reported through May 30, including six from Kaua'i and five from Hawai'i. Through the same period in 1996, three cases had been reported in the State.

Most of the Kaua'i cases had a history of fresh water exposure on the north shore. Kalihiwai river was a new "hot spot" for the disease, accounting for five cases. In the prior four years, only one case was exposed at this location. Reasons for the increase in number of cases exposed at this site are unknown.

Three cases on O'ahu were exposed at Maunawili stream and falls. Earlier last year, the Sierra Club received permission from the land owner to make trail im-



provements, making the falls more accessible. Although cases had occasionally been previously reported from that site, the number of cases increased sharply in 1996.

Two of the four cases on Maui were diagnosed as a result of a high index of suspicion and the initiative taken by District Health Office personnel on that island.

Diagnostic Challenges

Leptospirosis is probably one of the most under diagnosed diseases. Confirming cases of leptospirosis has always been a challenge. Because confirmatory serologic testing is only conducted by the Centers for Disease Control and Prevention (CDC), the only samples accepted for testing are paired samples or single samples drawn 14 days after onset of illness. A recent review of laboratory testing from one Kaua'i clinic may shed some light on this problem.

In 1996, the clinic submitted serum samples (the most sensitive diagnostic method) for leptospirosis testing on 51 patients. Acute and convalescent samples were obtained from 24 of the patients. Single convalescent samples were obtained on two patients. Of these 26, 11 (42%) were confirmed with leptospirosis by the Microscopic Agglutination Test at the CDC, including the two with single samples. Of the nine serologically confirmed cases with paired samples, all acute samples were negative on the Indirect Hemagglutination screening test (IHA) conducted by the Department of Health laboratory. If second samples had not been drawn on the nine cases, none would have been confirmed with leptospirosis.

The above example reflects the importance of submission of paired samples for serologic confirmation of leptospirosis.

(Information on Leptospirosis was provided to the Clean Water Branch by Dr. David M. Sasaki, D. VM., M.RH., Veterinary Medical Officer, Epidemiology Branch.)

Research is continuing at the University of Hawaii,



Department of Microbiology, to develop a test to identify leptospira in fresh water streams. Additional surveys to better define the epidemiology of leptospirosis are being planned. The Department of Health also has sponsored a community-based ad-Hoc Advisory Committee that has been developing research and service programs since 1988 to promote better health education and better understanding of the epidemiology of the disease. In 1990, the committee assisted the U.H. Department of Tropical Medicine in establishing a diagnostic laboratory for leptospirosis in Hawaii.

The Zoonoses Section heads the working committee devoted to research and service activities dealing with leptospirosis.

The information listed in the following Tables 16 through 19 was provided by the WBS report generating program.

TABLE 4-15: WATERBODIES AFFECTED BY FISH AND SHELLFISH^a CONSUMPTION RESTRICTIONS DUE TO TOXICANTS

NAME OF WATERBODY AND IDENTIFICATION NO. OR REACH NO.	WATER BODY TYPE	SIZE AFFECTED	SPECIFIC POLLUTANT OR STRESSOR	PROBABLE SOURCE(S) OF POLLUTANT	TYPE OF FISHING RESTRICTION				
					NO CONSUMPTION		LIMITED CONSUMPTION		COMMERCIAL FISHING BAN
					GENERAL POPULATION	SUB-POPULATION	GENERAL POPULATION	SUB-POPULATION	
MANOA STREAM HI-ALWS03	R	5 Miles	0200 PESTICIDES	4300 Other Urban Runoff	Yes	No	No	No	No
ALA WAI CANAL HI000320	E	0.02 Square Miles	0506 Lead	4300 Other Urban Runoff	Yes	No	No	No	No

^a Does not include shellfish harvesting restrictions due to pathogens. See Table 19 below.



**TABLE 4-16: WATERBODIES AFFECTED BY FISH KILLS
AND FISH ABNORMALITIES**

NAME OF WATERBODY AND IDENTIFICATION NO. OR REACH NO.	WATERBODY TYPE	SIZE AFFECTED	CAUSE(S) (POLLUTANT(S)) OF CONCERN	SOURCE(S) OF POLLUTANT(S)	NUMBER OF FISH KILLED	NUMBER OF FISH WITH ABNORMALITIES
HI-2-5-06	R	0.60 mi	0990 - water/flow variability	8950 - other	500	0

**TABLE 4-17: WATERBODIES AFFECTED BY SEDIMENT
CONTAMINATION**

NAME OF WATERBODY AND IDENTIFICATION NO. OR REACH NO.	WATERBODY TYPE	SIZE AFFECTED	CAUSE(S) (POLLUTANT(S)) OF CONCERN	SOURCE(S) OF POLLUTANT(S)
HI000320	E	0.02 sqmi	0200 - PESTICIDES	4300 - Other Urban Runoff
HI000320	E	0.02 sqmi	0500 - METALS	4000 - URBAN RUNOFF/STORM SEWERS
HI000320	E	0.02 sqmi	0506 - Lead	4300 - Other Urban Runoff
HI000817	E	0.52 sqmi	0500 - METALS	9000 - SOURCE UNKNOWN
HI000821	E	0.30 sq mi		1200 - Irrigated Crop Production
HI000821	E	0.30 sq mi		4000 - URBAN RUNOFF/STORM SEWERS
HI000821	E	0.30 sq mi		5500 - Petroleum Activities
HI000821	E	0.30 sq mi		7900 - MARINAS
HI000821	E	0.30 sq mi		8400 - Spills
HI000821	E	0.30 sq mi		8700 - Recreational Activities
HI000823	C	0.50 mi		1200 - Irrigated Crop Production
HI000840	C	1.15 mi		1200 - Irrigated Crop Production
HI001132	E	0.05 sq mi	0502 - Arsenic	0110 - Major Industrial Point Source



TABLE 4-18: WATERBODIES AFFECTED BY SHELLFISH ADVISORIES DUE TO PATHOGENS

NAME OF WATERBODY AND IDENTIFICATION NO. OR REACH NO.	WATERBODY TYPE	SIZE AFFECTED	SOURCES OF PATHOGENS AND/OR INDICATORS ^a
NONE			

^a Indicator include, but are not limited to fecal coliforms and E. coli.

TABLE 4-19: WATERBODIES AFFECTED BY BATHING AREA CLOSURES

NAME OF WATERBODY AND IDENTIFICATION NO. OR REACH NO.	WATERBODY TYPE	SIZE AFFECTED	CAUSE(S) (POLLUTANT(S)) OF CONCERN ^a	SOURCE(S) OF POLLUTANT(S)	COMMENTS (CHRONIC OR ONE-TIME EVENT)	MONTH/YEAR OF CLOSURE
None						

^a Pollutants include, but are not limited to medical waste, fecal coliforms, E. coli., enterococci, and other indicators of pathogenic contamination.

PUBLIC WATER SUPPLY/DRINKING WATER USE REPORTING

Only a limited number of surface water sources are utilized for drinking water purposes. As regulations on these sources become more stringent, the agencies providing potable water are opting to use other sources and abandoning surface sources. Surface sources include streams, springs, and ditch systems. The ditch systems and springs were not included in any assessments.

Of the streams, only those which are perennial were assessed. The drinking water intakes on the streams are located in the upper reaches, above the influence of all human-related activities. Consequently, the only potential contaminants are naturally occurring substances (e.g. pathogenic organisms.) State law requires treatment of all surface water sources to remove harmful pathogens.

The following are the streams that provide potable water. The lengths of the portions that serve as sources are listed next to each stream where available, but constitute a fraction of the total lengths of each individual stream.

TABLE G: LENGTH OF STREAMS USED FOR DRINKING WATER



Stream	Drinking Water Length	Total Length of Stream
Hawaii		
Waikoloa	1.0	62.3
Kohakohau	2.5	not perennial
Maui		
Iao	18.28	23.78
Kanaha	2.5	tributary to Kahoma (10.11)
Haipuaena	5.45	7.75
Waikamoi	8.9	unavailable
Honomanu	13.94	16.44

The Drinking Water Lengths are the lengths from the intake points up to the headwaters.

The total lengths of these streams used for drinking water is 52.57 miles and are considered fully supported. All of the streams were assessed except Kohakohau, which was not considered perennial. There are no Lakes or Reservoirs used for Drinking Water purposes.

The streams were assessed for the following contaminants:

Contaminants Monitored for in Surface Sources of Drinking Water

I. Bacti

☐ Total and fecal coliform

II. Synthetic Organic Chemicals

Regulated Organohalides

☐ Hexachlorocyclopentadiene

☐ Hexachlorobenzene

☐ Lindane

☐ Heptaclor

☐ Heptaclor Epoxide

☐ Endrin

☐ Methoxychlor

☐ Chlordane

☐ Toxaphene

☐ Arochlor 1016

☐ Arochlor 1221

☐ Arochlor 1232

☐ Arochlor 1242

☐ Arochlor 1248

☐ Arochlor 1254

☐ Arochlor 1260

☐ Simazine

☐ Atrazine

Unregulated (Phase II)



C Metribuzin
C Aldrin
C Butachlor
C Dieldrin
C Metachlor
C Propoachlor

III. Volatile Organic Chemicals

Regulated Contaminants

C Vinyl Chloride
C 1,1-Dichloroethylene
C 1,1,1-Trichloroethane (TCA)
C Carbon Tetrachloride (CTC)
C Benzene
C 1,2-Dichloroethane (EDC)
C Trichloroethylene (TCE)
C p-Dichlorobenzene
C 1,2,3-Trichloropropane (TCP)
C trans-1,2-Dichloroethylene
C 1,2-Dichloropropane (DCP)
C Toluene
C Ethylbenzene
C Chlorobenzene
C o-Dichlorobenzene
C Styrene
C m-Xylene } coelute
C p-Xylene
C o-Xylene
C Tetrachloroethylene (PCE)
C Dichloromethane
C 1,1,2-Trichloroethane
C 1,2,4-Trichloroethane

Unregulated Compound

C Chloromethane
C Bromomethane
C Chloroethane
C 1,1-Dichloroethane
C 2,2-Dichloropropane
C Chloroform
C 1,1-Dichloropropane
C Bromodichloromethane
C Dibromomethane
C trans-1,3-Dichloropropene
C cis-1,3-Dichloropropene
C 1,3-Dichloropropane
C Dibromochloromethane
C 1,1,1,2-Tetrachloroethane
C Bromoform
C 1,1,2,2-Tetrachloroethane
C Bromobenzene
C o-Chlorotoluene
C p-Chlorotoluene
C m-Dichlorobenzene

Unregulated Compounds on List 3

C Bromochloromethane
C Hexachlorobutadiene
C Napthalene
C 1,2,3-Trichlorobenzene



IV. Inorganic Chemicals

Metals

☐ Antimony
☐ Arsenic
☐ Barium
☐ Beryllium
☐ Cadmium
☐ Chromium
☐ Copper
☐ Mercury
☐ Nickel
☐ Lead
☐ Selenium
☐ Sodium
☐ Thallium

Non-metals

☐ Nitrate
☐ Nitrite
☐ Fluoride
☐ Cyanide
☐ Bromide
☐ Chloride
☐ Orthophosphate
☐ Sulfate

V. Other chemicals, such as pesticides, etc.

☐ Glyphosate
☐ Ethylene Dibromide
☐ 1,2-Dibromo-3-Chloropropane
☐ Carbamate



**Table 4-21: SUMMARY OF DRINKING WATER USE ASSESSMENTS
FOR RIVERS AND STREAMS**

Total Miles Designated for Drinking Water Use _____				
Total Miles Assessed for Drinking Water Use _____				
Miles Fully Supporting Drinking Water Use		% Fully Supporting Drinking Water Use		
Miles Fully Supporting but Threatened for Drinking Water Use		% Fully Supporting but Threatened for Drinking Water Use		
Miles Partially Supporting Drinking Water Use		% Partially Supporting Drinking Water Use		
Miles Not Supporting Drinking Water Use		% Not Supporting Drinking Water Use		

**Table 4-22: SUMMARY OF DRINKING WATER USE ASSESSMENTS
FOR LAKES AND RESERVOIRS**

Total Waterbody Area Designated for Drinking Water Use _____				
Total Waterbody Area Assessed for Drinking Water Use _____				
Acres Fully Supporting Drinking Water Use		% Fully Supporting Drinking Water Use		
Acres Fully Supporting but Threatened for Drinking Water Use		% Fully Supporting but Threatened for Drinking Water Use		
Acres Partially Supporting Drinking Water Use		% Partially Supporting Drinking Water Use		
Acres Not Supporting Drinking Water Use		% Not Supporting Drinking Water Use		